American
Physical
Society
One Physics Ellipse
College Park, MD 20740-3844
www.aps.org

****

Secrets of Sharks' Success

Researchers in Florida and Alabama Suggests
Presentation at Fluid Dynamics Meeting Today in Long Beach, CA

****

EMBARGOED for release until 7:00 p.m. Eastern time (U.S.) on Tuesday, Nov. 23, 2010

Contact: Jason Socrates Bardi,
American Institute of Physics
301-209-3091, office
858-775-4080, cell
jbardi@aip.org

WASHINGTON, D.C., November 23, 2010 -- New research from the University of South Florida suggests that one of the evolutionary secrets of the shark's success hides in one of its tiniest traits -- flexible scales on the bodies of these peerless predators that make them better hunters by allowing them to change directions while moving at full speed.

The key to this ability lies in the fact that the scales control water flow separation across the creatures' bodies, says Amy Lang of the University of Alabama who will present work she performed with her colleagues at the University of South Florida today at the American Physical Society's Division of Fluid Dynamics (DFD) annual meeting in Long Beach, CA.

Flow separation is an issue in systems like aircraft design, explains Lang, because it tends to cause vortices that impede speed and stability.

"In nature, if you look at surfaces of animals, you'll see that they are not smooth," she says. "They have patterns. Why? One common application of patterning a surface is to control flow -- think of the dimples of a golf ball that help the ball fly farther. We believe scales on fast-swimming sharks serve a similar purpose of flow separation control."

Based on experimental measurements and models of shark scales, Dr. Lang's team discovered that the bases of shortfin mako scales (literally small teeth covering their body) where they attach to the skin are not as wide as the tops of the scales. This tapered shape enables the scales to be easily manipulated to angles of 60 degrees or more, endowing them with movement called "denticle bristling."

Also, these flexible scales are only found on parts of the body where flow separation is most likely to occur, such as behind the gills on the side of the body. Denticle bristling is the probable mechanism leading to flow separation control for the shortfin mako shark.

"As we investigate further, we imagine applications of controlling flow separation in design of aircraft, helicopters, wind turbines -- anywhere flow separation is an issue," Lang adds.

The presentation, "Recent Observations on Shortfin Mako Scale Flexibility as a Mechanism for Separation Control" is at 4:10 p.m. on Tuesday, November 23, 2010 in the Long Beach Convention Center Room: Grand Ballroom B. ABSTRACT:
http://meetings.aps.org/Meeting/DFD10/Event/134387

This work is funded by the National Science Foundation.

IMAGE: There are images available for use by reporters. Contact jbardi@aip.org

CAPTION: Both images are of shortfin mako. The second image is of the mako scales from a sample on the side of the shark. The scales in the foreground have been manually bristled and measure approximately 0.2 mm in length.

CREDITS: Reporters may use these images so long as they credit P. Motta/Univ. South Florida.

****
MORE MEETING INFORMATION
The 63rd Annual DFD Meeting is hosted this year by the University of Southern California, California State University Long Beach, California Institute of Technology, and the University of California, Los Angeles.

It will be held at the Long Beach Convention Center, located in downtown Long Beach, California. All meeting information, including directions to the Convention Center is at:
http://www.dfd2010.caltech.edu/

USEFUL LINKS
Main meeting Web site: http://www.dfd2010.caltech.edu/
Search Abstracts: http://meetings.aps.org/Meeting/DFD10/SearchAbstract
Directions to Convention Center: http://www.longbeachcc.com/

PRESS REGISTRATION
Credentialed full-time journalist and professional freelance journalists working on assignment for major publications or media outlets are invited to attend the conference free of charge. If you are a reporter and would like to attend, please contact Jason Bardi (jbardi@aip.org, 301-209-3091).

ONSITE WORKSPACE FOR REPORTERS

A reserved workspace with wireless internet connections will be available for use by reporters in the Promenade Ballroom of the Long Beach Convention Center on Sunday, Nov. 21 and Monday, Nov. 22 from 8:00 a.m. to 5:00 p.m. and on Tuesday, Nov. 23 from 8:00 a.m. to noon. Press announcements and other news will be available in the Virtual Press Room (see below).

VIRTUAL PRESS ROOM
The APS Division of Fluid Dynamics Virtual Press Room will be launched in mid-November and will contain dozens of story tips on some of the most interesting results at the meeting as well as stunning graphics and videos. The Virtual Press Room will serve as starting points for journalists who are interested in covering the meeting but cannot attend in person. See: http://www.aps.org/units/dfd/pressroom/index.cfm

GALLERY OF FLUID MOTION
Every year, the APS Division of Fluid Dynamics hosts posters and videos that show stunning images and graphics from either computational or experimental studies of flow phenomena. The outstanding entries, selected by a panel of referees for artistic content, originality and ability to convey information, will be honored during the meeting, placed on display at the Annual APS Meeting in March of 2011, and will appear in the annual Gallery of Fluid Motion article in the September 2011 issue of the American Institute of Physics' journal, Physics of Fluids.

This year, selected entries from the 28th Annual Gallery of Fluid Motion will be hosted as part of the Fluid Dynamics Virtual Press Room. In mid-November, when the Virtual Press Room is launched, another announcement will be sent out.

****
ABOUT THE APS DIVISION OF FLUID DYNAMICS
The Division of Fluid Dynamics of the American Physical Society (APS) exists for the advancement and diffusion of knowledge of the physics of fluids with special emphasis on the dynamical theories of the liquid, plastic and gaseous states of matter under all conditions of temperature and pressure. See: http://www.aps.org/units/dfd/

####